

Outcome of pregnancy among Pre-existing Type-2 Diabetic Women

Rahman M¹, Islam MR², Alam UK³, Yesmin K⁴

Department of Pathology & Microbiology, University Dental College & Hospital, Dhaka, Bangladesh

Department of Research & Training Monitoring, Bangladesh College of Physicians and Surgeons (BCPS), Dhaka, Bangladesh

Department of Population Dynamics, National Institute of Preventive and Social Medicine (NIPSOM), Dhaka, Bangladesh

Raipura Upazila Health Complex, Narsingdi, Bangladesh

ABSTRACT:

Background: Diabetes mellitus is now one of the most common non-communicable diseases globally. As diabetes is a chronic and debilitating disease, it may have adverse effect on pregnancy and pregnancy outcomes.

Aim & Objective: To assess the outcomes of pregnancy among pre-existing type 2 diabetic women.

Methods: A cross sectional study was conducted among randomly selected 121 pre-existing type-2 diabetic women of post partum period, attended in postnatal ward and outdoor of Obstetrics and Gynaecology department, BIRDEM-2 hospital, Shegunbaghicha, Dhaka during the period from January 2012 to June 2012.

Results: The study results revealed that 43% of the respondents were within the age group of 31-35 yrs and only 7.4% was within the higher age group of >40 yrs. The mean age of the respondents was 33.37. Only 15.7% respondents had history of GDM in previous pregnancy. Mean difference between blood sugar level before current pregnancy and after delivery were significant ($p < 0.05$). Gestational time of present baby, 68.6% were born before date and only 1.7% was post dated. Majority of the respondents delivered baby by caesarian section that was around 82.6%. Relationship of blood sugar level after delivery with mode of delivery was significant ($p < 0.05$). Maternal outcome of the respondents 20.7% was premature labour and 1.7% was spontaneous abortion which is less common. Neonatal outcome 42.1% was live birth with no complication, 20.6% was hyperbillirubinaemia, 16.5% was respiratory disorder and 9.1% small for gestational age was common. Death after live birth was 1.7%. Low birth weight was 26.4%, 65.3% was normal and 8.3% was macrosomia.

Conclusion: Pre-existing type 2 diabetes mellitus is a public health problem, so it is considered that the findings of the study will not only help as guideline for preventive programme, but also serve as useful basis for future research and planning.

Key words: T2DM, Pregnancy, Pregnancy outcome, Bangladesh

I. INTRODUCTION

Diabetes mellitus (DM) is a chronic condition in which the body makes too little of the hormone insulin or cannot use it properly. Insulin is produced by the pancreas and helps glucose (sugar) enter cells from the bloodstream to be converted into energy. In uncontrolled diabetes, there is an inadequate supply of glucose to the cells and a build-up of glucose in the bloodstream.¹ This can lead to a range of disturbances affecting the heart, brain, kidneys and other parts of the body. Because the common feature of diabetes is high blood glucose, it is often mistakenly thought to be a single disease. There are actually several types of diabetes, with different causal mechanisms. The three main types are Type 1, Type 2 and gestational diabetes.²

Type 1 diabetes mellitus (T1DM) is marked by a total or near-total lack of insulin. It results from the body destroying its own insulin-producing cells in the pancreas. In 2007, 987 new cases of Type 1 diabetes in children aged less than 15 years were recorded. This equates to an annual incidence of 24.2 cases per 100,000 children (around 1 in 4,000) and represents a 30% increase in the rate of new cases compared with that in 2000.³ Many people with this form of diabetes eventually need insulin therapy to control their blood glucose levels.

Type 2 diabetes mellitus (T2DM) is marked by reduced levels of insulin, or the inability of the body to use insulin properly (insulin resistance). T2DM is the most common form of diabetes, occurring mostly in people aged 50 years and over, and accounting for 85-90% of all cases. Although still uncommon in childhood, T2DM is becoming increasingly recognised in that group.⁴

DM is a clinical syndrome characterized by hyperglycaemia due to absolute or relative lack of insulin, which affects the metabolism of carbohydrate, protein, fat, water and electrolytes. Morbidity and mortality may

result from acute metabolic de-compensation while long standing metabolic derangement is frequently associated with permanent and irreversible functional and structural changes in the cells of the body, those of the vascular being particularly susceptible.⁵

DM is a disease in which the body cannot use food for energy correctly. Our bodies use glucose (a form of sugar) from the food. During pregnancy, they still making insulin but it does not work, as it should. a genetic predisposition to this condition complies with the many hormones produced by the placenta during pregnancy, making the women's body resistant to the action of its own insulin. Without enough insulin on the job, sugar stays in the blood. Blood sugar level then rises above normal. This is an unsafe situation for both mother and baby. DM is the second commonest medical disorder (after hypertension 6%) complicating pregnancy with an incidence about 5 percent.⁶

Pre-gestational diabetes has an incidence about 2-4/1000 percent. These are also small number of older women with non-insulin dependent diabetes mellitus (NIDDM) have the same mortality and morbidity rate as the babies of insulin dependent diabetes mellitus (IDDM) women.⁷

The estimated DM prevalence for 2010 is 285 million and is expected to affect 438 million people by 2030. The International Diabetes Federation (IDF) estimates that in 2010 the five countries with the largest numbers of people with diabetes are India, China, the United States, Russia and Brazil.

The IDF also reported that in 2010 the five countries with the highest diabetes prevalence in the adult population are Nauru, the United Arab Emirates, Saudi Arabia, Mauritius and Bahrain. Low and middle income countries face the greatest burden of diabetes.⁸

Diabetes is a common health condition. The chances of developing it may depend on a mix of genes, lifestyle and environmental factors. The risk factors are different for Type 1 and Type 2 diabetes. T1DM develops when the insulin-producing cells in the pancreas have been destroyed. No one knows for certain why these cells have been damaged, but the most likely cause is the body having an abnormal reaction to the cells. This may be triggered by a viral or other infection. T2DM usually appears in middle-aged or older people, although more frequently it is being diagnosed in younger overweight people, and it is known to affect South Asian people at a younger age. T2DM occurs when the body is not making enough insulin, or the insulin it is making is not being used properly. The risk of developing T2DM can be reduced by changes in lifestyle.⁹

On average, if either parent has the condition, the risk of developing it is 15 per cent, if both parents have the condition, the risk of developing it is 75 per cent, if a non-identical twin has the condition, the risk of developing it is 10 per cent, if an identical twin has the condition, the risk of developing it is 90 per cent.

T2DM is up to six times more common in people of South Asian descent and up to three times more common among people of African and African-Caribbean origin.¹⁰

According to the *Health Survey for England 2004*, doctor-diagnosed diabetes is almost four times as prevalent in Bangladeshi men, and almost three times as prevalent in Pakistani and Indian men compared with men in the general population. Among women, diabetes is more than five times as likely among Pakistani women, at least three times as likely in Bangladeshi and Black Caribbean women, and two-and-a-half times as likely in Indian women, compared with women in the general population.

In the same survey, diabetes was generally rare among those aged 16–34, but was highest among Indian men (2 per cent), Black African men (1.7 per cent) and Irish women (1.7 per cent). Almost two in every three people in the UK are overweight or obese (61.9 per cent of women and 65.7 per cent of men). In 2006, almost one in four children in England measured in reception year was overweight or obese. In Year 6 in England, the rate was nearly one in three. The Department of Health recommends that everyone has at least 30 minutes moderate intensity physical activity a day on five or more days a week.

Deprivation is strongly associated with higher levels of obesity, physical inactivity, unhealthy diet, smoking and poor blood pressure control. All these factors are inextricably linked to the risk of diabetes or the risk of developing serious complications for those already diagnosed. The statistics on deprivation shown here are taken from three different health surveys.¹¹ Statistics for England and Scotland are broken down into five household income groups. Statistics for Wales are broken down into eight socio-economic groups so it is not always possible to make direct comparisons.

Pregnancy poses additional risks for women with diabetes. The chances of having difficulties are greatly reduced through tight blood glucose control before and during pregnancy.¹² Babies of women with diabetes are:

- five times as likely to be stillborn
- three times as likely to die in their first months of life¹³
- three-six times as likely to have a major congenital anomaly. This number could be higher as this

figure is not adjusted for the higher rate of abortions in women where congenital abnormalities are found.¹⁴ Two in three mothers with pre-existing diabetes have T1DM. The proportion of births to women with diabetes is rising due to an increased prevalence of Type 2 diabetes in young people. Diabetes also has a significant impact

on health and social services. People with diabetes are twice as likely to be admitted to hospital. At least one in ten people in hospital has diabetes at any moment in time.¹⁵ People with diabetes experience prolonged stays in hospital. This results in about 80,000 bed days per year.¹⁶

In Bangladesh, the prevalence of pre-existing diabetic outcomes are predicted much more than the previous study. This prevalence is much more in urban than in rural areas. Changes in lifestyle including decreased physical activity and increased caloric consumption continue to fuel the obesity epidemic. Pre-existing diabetes is associated with poor pregnancy outcomes as well as increased risk of longer-term morbidity for both mother and child. Some of the cases of pre-existing diabetes are continuation of previous case of GDM. In Bangladesh diabetes has become highly prevalent and is growing at a faster rate. Identification of high risk group like pre-existing type 2 diabetes helps to initiate preventive and control measures for the health care provider so that the onset of complications and poor outcomes of pregnancy can be lowered or prevented. And thus huge health expenditure for diabetes related poor pregnancy outcomes can be minimized.

The maternal and fetal outcomes among women who had pre-conceptional type 2 diabetes mellitus in Bangladesh are not well documented. This study will help us to determine possible maternal and fetal outcomes among women with pre-existing type 2 diabetes attending BIRDEM 2 hospital and will create awareness among diabetic women who wants to become pregnant, public health experts, medical personnel and health intervention programme to reduce maternal mortality, neonatal mortality and morbidity due to consequences of diabetes.

Besides its academic significance, the study can deduce useful policy implications. It is expected that the study will provide baseline information for medical men, public health experts, common people and diabetic women as to fate of diabetic pregnancy. So, the concerned person will provide necessary preventive measure for better outcome by screening test at an appropriate time before being pregnant or during pregnancy, managing effectively to hinder the inevitable fate and thereby reduce maternal and fetal morbidity and mortality. In addition, it is aimed at creating consensus among health care personnel that it is not an uncommon and untreatable problem, which is frequently overlooked. So I think the study will show a picture of being aware of being diabetic pregnant women as well as encourage her family to take care of her, knowing its outcomes, need of taking timely, proper antenatal care and policy making by the Government of the people's republic of Bangladesh. Thus there will be a healthy diabetic mother, a healthy neonate as well as a healthy nation.

II. METHODS

A cross sectional study was conducted from January 2012 to June 2012 to assess the outcome of pregnancy among 121 pre-existing type-2 diabetic women attending in BIRDEM 2 hospital, Shegunbagicha, Dhaka. This hospital was chosen as study place, as diabetic female patients from Dhaka city and different districts were referred here for proper management. All the women with gestational diabetes and type-1 diabetes and women without a diabetic guidebook were excluded from this study. Samples were collected randomly through interview and record review by a semi structured Questionnaire. Some parameters of the study subjects such as height, weight in 1st ANC and gestational age were taken from the medical record of the patient. According to specific objectives, the variables were identified and an English questionnaire was drafted. After necessary correction and thorough checking the English questionnaire was translated into Bangla. The questionnaire was pre tested on respondents with similar type of background who was from Ad-Din hospital, Moghbazar, which was not included in the study sample. Some problems were identified and corrected accordingly. The questionnaire and the checklist were finalized after necessary modifications and ultimately, 72 items were finalized on the instrument for collection data. Outcome of pregnancy among pre-existing type-2 diabetic women was categorized into two major components- Maternal outcomes & foetal outcomes. Data that were already checked in the field to ensure that all information has been properly collected checked again for completeness and internal consistency. The inconsistencies that were due to mistakes in the recording were corrected. Those which were not possible to correct were excluded. On quality control check, verification of how they were transformed into codes and subsequently entered into the computer also done.

At the end of each day of data collection, each questionnaire was checked to see whether it was filled completely and consistently. The data entry was started immediately after completion of data collection. The research protocol was approved by the ethical committee of NIPSOM, Dhaka, Bangladesh, before starting the study. Ethical clearance was taken from the BIRDEM 2 hospital for conducting the study among the respondents attending the BIRDEM 2 hospital. Informed consent will be obtained from all respondents. All respondents will be informed about their full right to participate or to refuse to participate in the study. An assurance will be given that all the information provided by them will be kept confidential.

Data processing and analysis were done using SPSS (Statistical Package for Social Sciences) version 16. Data were analyzed according to the objectives of the study. The test statistics used to analyze the data were descriptive statistics by “t” test. Bivariate correlation was done to find out the associations between maternal weight during first ANC visit and baby’s birth weights. Level of significance was set at 0.05. The results were presented in the form of tables and diagram.

III. RESULTS

Table 1 reveals that age group distribution of the respondents. Most common age group were 31-35 yrs age group 52(43.0%) and lowest age group were >40 years 09 (7.4%). Mean (\pm SD) were 33.37 (\pm 4.20). Majority percent religion were Islam 97 (80.2%) and 24 (19.8%) Hindu. Majority percent respondents come from urban 104 (86.0%) and 17 (14.0%) come from rural. Most of the respondents were up to HSC 33 (27.2%), 32 (26.5%) were graduate and only 9 (7.4%) were masters. Occupation of the respondents majority were house wife 85 (70.2%), followed by 28 (23.1%) were service holder. 91 (75.2%) respondents were > 20000 tk. monthly family income. Mean (\pm SD) of income was 37487.60 (\pm 20596.16). Age of first pregnancy 26 (21.5%) were < 20 yrs age group, 43 (35.5%) were 20-25 yrs age group, 52 (43%) were > 25 yrs age group. Mean (\pm SD) age of first pregnancy was 21.65 (\pm 4.09). 53 (44%) were male baby and 68 (56%) were female.

Table 2 represents that 19(15.7%) respondents were history of GDM in previous pregnancy. 31 (26%) respondents were taken pre-pregnancy care, 90 (74%) respondent were not taken pre-pregnancy care. 85 (70.2%) had no co-morbidity, 29 (24.0%) had hypertension and 7 (5.8%) had bronchial asthma.

Diabetic first pregnant that 94 (77.7%) were non pregnant state. Whereas 04 (3.3%) were during pregnancy. 118 (97.5%) respondents taking medication for diabetic. 03 (2.5%) were not taking medication for diabetic. 100 (82.6%) respondents taking medication regular. 21 (17.4%) were irregular. Low birth weight was 26.4%, 65.3% was normal and 8.3% was macrosomia.

Table 3 shows relationship blood sugar level with mode of delivery, mean fasting blood sugar level after delivery 3.96 (\pm 2.09) were normal delivery and 4.90 (\pm 1.68) were caesarian delivery, after 2 hrs breakfast in after delivery 6.07 (\pm 3.07) normal delivery and mean (\pm SD) 7.23 (\pm 2.21) were caesarian delivery. That’s different was statistically significant ($p < 0.05$).

Table 4 shows that maternal outcome of the respondents 20.7% was premature labour and 1.7% was spontaneous abortion which is less common.

Table 5 reveals that, neonatal outcome 42.1% was live birth with no complication, 20.6% was hyperbillirubinaemia, 16.5% was respiratory disorder and 9.1% small for gestational age was common.

Figure 1 shows positive correlation between maternal weights with baby’s birth weights. That is statistically significant ($p < 0.05$)

IV. DISCUSSION

The mean age of the respondents was 30.8 ± 4.7 years. It was found that highest Percentage (37.9) were in the age range of 30-34 years followed by 30.1 percent in age group 25-29 years, 24.3 percent 35 years and above and 7.8 percent below 25 years i.e. diabetic mother tends to be older. A study Carley BM, et al., USA, showed diabetic women are older.¹⁷

In this study most of the respondent were up to HSC 33 (27.2%), 32 (26.5%) were graduate and only 9 (7.4%) were masters.

Regarding the level of education of the respondents, 35.0% had HSC level of education followed by 27.2 percent graduate and above, 15.5% SSC, 12.6% secondary and 9.7 percent primary or non-formal education. This picture does not correspond with national data where female enrolment up to secondary school is only 30.9%. Female literacy rate is 26.1%¹⁸

In this study reveals that 85 (70.2%) respondents occupational status were house wife, followed by 28 (23.1%) were service holder. National data shows 78.3% women are unpaid family worker (housewife) and employees or service holders are only 7.6%.¹⁹

In this series 91 (75.2%) respondents were > 20000 tk. monthly family income. Mean (\pm SD) of income was 37487.60 (\pm 20596.16).

This picture indicates that the respondents were mostly in upper and middle socio-economic class. National data for monthly income (rural area) Tk. 1000 to 1499- 7.31 %, Tk. 1500 to 1999-12.05%, Tk. 2000 to 2999-15.55%, Tk. 3000 to 3999-23.62%, Tk. 4000 to 4999-8.04%, U. 5000 and above-15.83%. This difference may be due to situation of study place in Dhaka City and most of the respondents residing in urban area. In BIRDEM 2 less than 10% patient are registered from poor class.²⁰

In this series majority percent religion was Islam 97(80.2%). Regarding residence 104 (86.0%) respondent come from urban.

According to national data 85% population live in rural area.¹⁹ In BIRDEM 2 of the registered patients, the urban subjects are disproportionately higher than the rural subjects. Almost 2/3rd was from urban rest from rural.²⁰

Regarding religion, these study findings is 85.5% Muslim, 10.7% Hinduism, 1.9% Christianity, 1.9% Buddhism, and our national picture is 87.7% Muslim, 11.0% Hinduism, 0.3% Christianity and 0.9% Buddhism. That is regarding religion, this study finding is more or less similar with national figure.

In this study reveals that 100 (82.6%) respondent delivered were caesarian delivery and only 21 (17.4%) were normal delivery.

In Bangladesh only 2% delivery is conducted by caesarian section.¹⁸ The reason may be that most of the pregnancies were not allowed to continue beyond the Expected Date of Delivery (EDD) for fear of sudden intra uterine death which mostly occurs in later part of pregnancy and some pregnancy had induction failure. Beside these, prolonged infertility, history of previous caesarian sections fatal distress, pre-eclampsia and placenta praevia was present as pre-disposing factors in some cases. Diabetes itself is not the induction of abnormal delivery.

A study of Begum Shamsun Nahar in 1987 also showed rate of LUCS 82%.²¹ The study of Carley BM et al., 1997, USA, showed gestational diabetic women were significantly older, heavier, of great parity. Hypertension and Caesarian section delivery were significantly increase in these women compared with general obstetric population.²² Preterm delivery in women with pregestational diabetes mellitus or chronic hypertension relative to women with uncomplicated pregnancies as described in study of Baha M. Sibai, et al., Chicago.²³

In this series relationship blood sugar level with mode of delivery, mean blood sugar level after delivery 3.96 (± 2.09) were normal delivery and 4.90 (± 1.68) were caesarian delivery, after 2 hrs breakfast in after delivery 6.07 (± 3.07) normal delivery and mean (\pm SD) 7.23 (± 2.21) were caesarian delivery. That's different was statistically significant ($p < 0.05$). In this study reveals that, gestational time of present baby 83 (68.6%) were before date and 2 (1.7%) were post dated.

In this series reveals that, neonatal outcome 51 (42.1%) were live birth with no complication, 25 (20.6%) were hyperbilirubinaemia, 20 (16.5%) were respiratory disorder, 11 (9.1%) were small for gestational age, were most common. 2 (1.7%) were death after live birth. Birth weight 32 (26.4%) were LBW, 79 (65.3%) were normal and 10 (8.3%) were macrosomia.

Karim E et al in a study in Bangladesh found a mean birth weight of 3.8kgs among the babies of established diabetic mother.²¹ A study Rolv Skjaerven et al, Oslo, Norway²⁴ and C.S Dawn.²⁵ also correspond with this study.

Our study finding was quite similar with the findings of another study. It showed hyperbilirubinaemia was more common among women with GDM than in women without GDM. Maternal hyperglycemia and subsequent induction of fetal hyperinsulinaemia and reduced oxygenation were hypothesized to lead to increased fetal oxygenation uptake, fetal erythropoiesis and subsequent hyperbilirubinaemia.²⁶

Approximately 80% of people with diabetes live in poor and developing countries and many of them living in rural areas and small towns are without access to adequate basic health care. The lack of access to healthy foods and no opportunities for exercise in developing countries have created rising obesity. This obesity causes increase in type 2 diabetes mellitus.

V. CONCLUSION

Diabetes in pregnancy is increasing and, as a result, a greater awareness is required regarding the associated health risks that diabetes in pregnancy poses for both mother and the growing fetus. Stillbirths and congenital abnormalities contribute to the increased perinatal morbidity and mortality in diabetic pregnancies. Maternal hyperglycaemia is a cause for this and hence there is a need to achieve tight glycaemic control not only antenatally but also preconceptionally, as this has been shown to improve pregnancy outcomes. Early antenatal care is required in all women with pre-gestational diabetes, with regular diabetic and obstetric input. Antenatal management should be based on the national evidence based clinical guidelines for diabetes in pregnancy and should cover all aspects of care to the growing fetus, and also address glycaemic control and management of maternal diabetic complications. By control of glycemic status in diabetic pregnant woman ensures a happy outcome. In short, pre-gestational T2DM is still associated with an increased incidence of adverse pregnancy outcome despite a mean HbA1c level within normal ranges and a high incidence of planned pregnancies. Improvements in outcomes may be expected from more active specialist peri-gestational care, including pre-pregnancy referral to specialist care, and a tailored approach for women from migrant communities.

VI. ACKNOWLEDGEMENT

We acknowledge the ethical review committee of National Institute of Preventive and Social Medicine (NIPSOM) and the authorities of Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM)-2 for their support. We are also grateful to all the respondents for their sincere cooperation.

Conflict of interest: None declared.

REFERENCES

- [1]. Various Aspects of Diabetes Mellitus, <http://www.assignmentpoint.com/science/medical/various-aspects-of-diabetes-mellitus.html> accessed 14/12/2014.
- [2]. Diabetes: Australian facts 2002 ,Australian Institute of Health and Welfare <http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=6442454924> accessed 14/12/2014
- [3]. Disorders of blood glucose, http://www.weahunter.com.au/doc/aoch/NUT2/NUT2_PowerPointPDF_Disorders_of_Blood_Glucose.pdf accessed 14/12/2014.
- [4]. Australia's health 2010, Diseases and injury, <http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=6442452954> accessed 14/12/2014.
- [5]. Macleod John, Edwards Christopher, Bouchier Ian eds: Davidson's Principles and Practice of Medicine, Endocrine and Metabolic and Metabolic Disease.16th ed., Edinburgh (UK): Churchill Livingstone, 1991, pp.461-491.
- [6]. Forrest Jacqueline Darroah: Preventing Unintended Pregnancy; The Role of Hormonal Contraceptives. Epidemiology of Unintended Pregnancy and Contraceptive Use. Am J Obstet. Gynecol 1994;170(5) Part 2: pp. 1485-1494.
- [7]. Lewis TLT, Chamberlian GVP eds. In: Obstetrics by Ten Teachers. 6th ed. London. Edward Arnald, 1995, pp.122-126.
- [8]. Globally - Diabetes Help <http://www.diabetes-help.co.uk/section6-page1.php?s=208&subs=115> accessed 14/12/2014.
- [9]. Tuomilehto J, Lindström J, Eriksson JG, et al. Prevention of Type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance.N Engl J Med. 2001; 344 (18); 1343-1350.
- [10] Globally - Diabetes Help, <http://www.diabetes-help.co.uk/section6-page3.php?s=208&subs=117> accessed 14/12/2014.
- [11]. All Party Parliamentary Group for Diabetes and Diabetes UK (2006). Diabetes and the disadvantaged: reducing health inequalities in the UK: World Diabetes Day 14 November 2006. http://www.diabetes.org.uk/Documents/Reports/Diabetes_disadvantaged_Nov2006.pdf accessed 14/12/2014.
- [12]. Taylor R & Davison JM. Type 1 diabetes and pregnancy, BMJ.2007; 334 (7596): 742-745.
- [13]. CEMACH (Diabetes in pregnancy: are we providing the best care? Findings of a national enquiry. 2007 <http://bit.ly/cemach2007> accessed 14/12/2014.
- [14]. Bell, R. et al. Peri-conception hyperglycaemia and nephropathy are associated with risk of congenital anomaly in women with pre-existing diabetes: a population-based cohort study. Diabetologia. 2012;55 (4): 936-947.
- [15]. Sampson MJ, Duxio N, Ferguson B et al. Total and excess bed occupancy by age, speciality and insulin use for nearly one million diabetes patients discharged from all English acute hospitals. Diabetes Research and Clinical Practice. 2007; 77 (1): 92-98.
- [16]. Sampson MJ, Crowle T, Dhatariya K et al. Trends in bed occupancy for in patients with diabetes before and after the introduction of a diabetes inpatient specialist nurse service. Diabetic Medicine2006;23(9):1008-1115.
- [17]. Casey BM, Lucas MJ, McIntire DD, Leveno KJ: Pregnancy Outcomes in Women with Gestational Diabetes Compared with the General Obstetric Population in Dallas, USA. Int. J Obstet. Gynaecol; 1997, Dec; 90(6):869-73.
- [18]. Bangladesh Demographic and Health Survey 1999-2000 (BDHS); Preliminary Report: National Institute of Population Research and Training (NIPORT), Dhaka. Bangladesh/Mitra and Associate.
- [19]. Statistical Pocket Book of Bangladesh: Bangladesh Bureau of Statistics, 2000.
- [20]. Sayeed MA, Khanam PA, Hossain MM. Mahtab H and Khan Azad AK: Diabetic subjects with severe Hypoglycaemia and Proteinuria are more Prevalent in Rural than Urban and in Poor than Rich People, Diab Endocr J 1999, 27(2):35-40.
- [21] Karim E, Chowdhury S, Begum F, et al: Pregnancy Outcome in Glucose Intolerance;; A Preconception of Good Glycaemic Control, J Inst. Pastyard., Med. R 1993, 8(1):1-6.
- [22] Casey BM, Lucas MJ, McIntire DD, Leveno KJ: Pregnancy Outcomes in Women with Gestational Diabetes Compared with the General Obstetric Population in Dallas, USA. Int. J Obstet. Gynaecol; 1997, Dec; 90(6):869-73.
- [23]. Sibai Baha M, Caritis Steve N, Hauth John C, MacPherson C, VanDorsten J. Peter , Klebanoff M, et al. Preterm delivery in women with pregestational diabetes mellitus or chronic hypertension relative to women with uncomplicated pregnancies. American Journal of Obstetrics and Gynecology. American Journal of Obstetrics & Gynecology , Volume 183 , Issue 6 , 1520 – 1524.
- [24]. Pediatric research <http://www.nature.com/pr/journal/v62/n5/full/pr2007292a.html> accessed 14/12/2014.
- [25]. Professor C.S. Dawn "Textbook of Obstetrics and Neonatology" 13th Edition. Published by Dawn Books 25-B, CIT Road, Sch. 52, Calcutta. https://books.google.com.bd/books?id=fteqn1MoAZkC&pg=PA139&dq=cs+dawn+neonatology&hl=en&sa=X&ei=4uCNVPPIA4W_uAT-4CACg&ved=OCB0Q6AEwAA#v=onepage&q&f=false accessed 14/12/2014.
- [26]. http://www.reddit.com/r/askscience/comments/kyrqu/why_does_high_blood_sugar_cause_hyperbilirubinemia/ accessed 14/12/2014.

Tables and Figure

Table 1: Distribution of the respondents according to socio-demographic characteristics

Characteristics	Frequency	Percentage
Age		
25-30	31	25.6
31-35	52	43.0
36-40	29	24.0
>40	9	7.4
Religion		
Islam	97	80.2
Hindu	24	19.8
Residential status		
Urban	104	86.0
Rural	17	14.0
Educational status		
Primary	15	12.4
SSC	32	26.5
HSC	33	27.2
Graduate	32	26.5
Masters	9	7.4
Occupational status		
Service	28	23.1
Housewife	85	70.2
Others	8	6.6
Monthly family income		
Up to 10000	8	6.6
10000-20000	22	18.2
>20000	91	75.2
Age of the first pregnancy		
<20 years	26	21.5
20-25 years	43	35.5
>25 years	52	43.0
Sex of the child		
Male	53	44.0
Female	68	56.0

Table 2: Distribution of the respondents according to clinical characteristics

Characteristics	Frequency	Percentage
GDM		
History of GDM	19	15.7
No history of GDM	102	84.3
Pre-pregnancy care		
Having Pre-pregnancy care	31	26.0
Non pre-pregnancy care	90	74.0
Co-morbidity		
Nil	85	70.2
HTN	29	24.0
Bronchial asthma	7	5.8
Diagnosed as diabetic		
During previous pregnancy	23	19.0
During current pregnancy	4	3.3
Non pregnant state	94	77.7
Taking medication for diabetes		
Yes	118	97.5
No	03	2.5
Taking medication regularly		
Regular	100	82.6
Irregular	21	17.4
Mode of delivery		
Caesarian delivery	100	82.6
Normal delivery	21	17.4
Gestational time of present baby		
Full term	36	29.7
Before date	83	68.6
Post date	2	1.7
Birth weight of babies		
LBW <2.5 Kg	32	26.4
Normal 2.5-3.9 Kg	79	65.3
Macrosomia 4 or more Kg	10	8.3

Table 3: Mean distribution of blood sugar level before and during pregnancy and after delivery

Blood sugar level	Mode of delivery		P value
	Normal vaginal delivery Mean(\pm SD)	Caesarian delivery Mean(\pm SD)	
Fasting blood sugar level of mother before current pregnancy	6.78(\pm 1.36)	7.17(\pm 1.76)	0.34
After 2 hours breakfast before pregnancy	10.55(\pm 2.08)	10.69(\pm 2.12)	0.78
Fasting blood sugar level of mother during pregnancy	6.07(\pm 1.13)	6.55(\pm 1.61)	0.20
After 2 hours breakfast during pregnancy	9.11(\pm 1.90)	9.26(\pm 2.00)	0.76
Fasting blood sugar level of mother after delivery	3.96(\pm 2.09)	4.90(\pm 1.68)	0.02
After 2 hours breakfast after delivery	6.07(\pm3.07)	7.23(\pm2.21)	0.04

Table 4: Distribution of the respondents according to maternal outcome

Maternal outcome	Frequency	Percentage
Premature labour	25	20.7
Leg swelling	24	19.8
Mother without any complication before and after delivery	21	17.4
Unfavorable pelvis	15	12.4
UTI	12	10.0
Wound infection	10	8.3
Post partum haemorrhage	9	7.4
Preeclampsia	3	2.5
Spontaneous abortion	2	1.7

Table 5: Distribution of the respondent's foetal outcome

Neonatal outcome	Frequency	Percentage
Live birth with no complication	51	42.1
Hyperbilirubinaemia	25	20.6
Respiratory disorder	20	16.5
Small for gestational age	11	9.1
Infection	6	5.0
IUD	3	2.5
Live birth with birth defects	3	2.5
Death after live birth	2	1.7

Figure 1: Scatter diagram showing weight in first ANC and baby's birth weight

